

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

Listing of Claims:

1. (Original) A friction stir welding method, comprising:
 - in one end of a first member, providing respectively a recessed portion, in a thickness direction, to an outer face at one side of said first member and to an outer face at another side of said first member, opposite said one side and providing a third member extending from said recessed portion at said one side to said recessed portion at said other side,
 - overlapping one end of a second member to the respective recessed portions of the outer faces at said one side and at said another side of said first members, thereby providing an overlapped portion, and
 - under a condition where said first member and said second member at said overlapped portion are supported, carrying out a friction stir welding at said overlapped portion by inserting a rotary tool at said overlapped portion from an outer side of the first member, said rotary tool being inserted so as to overlie a central portion of a width of the third member.

2. (Original) A friction stir welding method according to claim 1, wherein the friction stir welding is carried out under a condition where an end portion of said second member at an outer side of said overlapped portion and said first member in a vicinity of said overlapped portion, are supported.

3. (Original) A friction stir welding method according to claim 2, wherein the friction stir welding is carried out under a condition where said end portion of said second member in said outer side of said overlapped portion and said first member in said vicinity of said overlapped portion are mounted on a bed, the friction stir welding being carried out from an upper portion of said overlapped portion.

4. (Original) A friction stir welding method according to claim 3, wherein after friction stir welding has been carried out at said overlapped portion from the upper portion, re-mounting said first member and said second member on said bed by turning over said first member and said second member, and

thereafter again carrying out friction stir welding at said overlapped portion using said rotary tool from an upper portion at the end portion of the outer side of said second member in said overlapped portion.

5. (Original) A friction stir welding method according to claim 2, wherein:
said overlapped portion includes a first overlapped portion at the one side of the first member and a second overlapped portion at the another side of the first member,

said rotary tool is arranged at an outer side of said first overlapped portion and another rotary tool is arranged at an outer side of said second overlapped portion,

under a condition where said another rotary tool is arranged in an extension direction of a rotation center of said rotary tool, the friction stir welding by said rotary tool and said another rotary tool is performed at the same time.

6. (Original) A friction stir welding method according to claim 1, wherein:
a part of the end portion of said second member overlaps said respective
portions,

another part of the end portion of said second member abuts said first
member, providing two abutted portions, and
carrying out the friction stir welding to said abutted portions.

7. (Original) A friction stir welding method according to claim 6, wherein
the friction stir welding is carried out to a depth of said first member between said
two recessed portions.

8. (Original) A friction stir welding method, comprising:
preparing a first member having a first plate, a second plate substantially in
parallel to said first plate, and a third plate connecting an end portion of said first
plate and said second plate and being substantially orthogonal to said first plate,
providing a recessed portion of a connection portion between said third plate
and said first plate,
opening said recessed portion directed toward an outer side in a thickness
direction of said first member and toward one end side of said first member,
overlapping an end portion of a second member to said recessed portion, to
provide an overlapped portion, and
under a condition where a connection portion of said second plate and said
third plate is supported, carrying out a friction stir welding at said overlapped portion
using a rotary tool located at an outer side of an end side of said second member,

wherein while carrying out the friction stir welding the rotary tool overlies a central portion of a width of the third member.

9. (Original) A friction stir welding method according to claim 8, wherein:
said overlapped portion is in a range of an extension line in a thickness of said third plate, and

the friction stir welding is carried out to said overlapped portion with said rotary tool positioned in said range of said extension line in the thickness of said third plate.

10. (Original) A friction stir welding method according to claim 9, wherein the friction stir welding is carried out by positioning a rotation center of said rotary tool in said range of said extension line in the thickness of said third plate.

11. (Original) A friction stir welding method according to any one of claims 8, 9 and 10, wherein:

a part of an end portion of said second member overlaps with said recessed portion,

another part of said end portion of said second member is abutted to an end portion of said first plate, to provide an abutted portion, and

carrying out the friction stir welding to said abutted portion.

12. (Original) A friction stir welding method according to claim 11, wherein the friction stir welding is carried out to said first member, through said recessed portion.

13. (Original) A friction stir welding method, comprising:
preparing a first member having a first plate, a second plate substantially in parallel to said first plate, and a third plate for connecting an end portion of said first plate and said second plate and being substantially orthogonal to said first plate,

providing respectively a recessed portion to a connection portion of said third plate and said first plate and a recessed portion to a connection portion of said third plate and said second plate,

the respective recessed portions having openings directed toward an outer side in a thickness direction of said first member and a side of said one end of said first member,

overlapping an end portion of a second member to said respective recessed portions, forming overlapped portions, and

under a condition where said first member and said second member at one of the overlapped portions is supported, positioning a rotary tool in an extension line in a plate thickness of said third plate and inserting said rotary tool to the other of the overlapped portions from said outer side, and

carrying out a friction stir welding to said overlapped portion.

14. (Original) A friction stir welding method according to claim 13, wherein:
after the friction stir welding of said other of the overlapped portions has been
carried out, reversing said first member and said second member, and
under a condition where said second member at at least an outer side of said
other of the overlapped portions is supported, carrying out the friction stir welding to
said one of the overlapped portions using said rotary tool from at least an outer side
of an end portion of said second member at said one of the overlapped portions.

15. (Original) A friction stir welding method according to claim 13, wherein:
part of the end portion of said second member overlaps said two recessed
portions,
another part of the end portion of said second member abuts an end portion
of said first member, forming an abutted portion, and
carrying out the friction stir welding to said abutted portion.

16. (Original) A friction stir welding method according to claim 15, wherein
the friction stir welding is carried out to a depth between said two recessed portions.

17. (Original) A friction stir welding method, comprising:
preparing a first member and a second member each having a first
plate, a second plate substantially parallel to said first plate, and a third plate for
connecting a midway of an end portion of said second plate and said first plate,

providing respectively a recessed portion to a connection portion of said third plate and said first plate of said first member and a recessed portion to a connection portion of said third plate and said second plate of said first member,

opening the respective recessed portions directed toward an outer side in a thickness direction of said respective member and a side of said end portion of said respective member,

overlapping an end portion of said first plate of said second member to one of the recessed portions of said first member, to provide an overlapped portion, and

under a condition where said first plate of said first member and said first plate of said second member are supported, carrying out friction stir welding of said overlapped portion by inserting a rotary tool to said overlapped portion between said recessed portion of said first member and said second plate of said second member from at least an outer side of said first plate of said second member, wherein said rotary tool is inserted so as to overlie a central portion of a width of said third plate of said first member at said overlapped portion.

18. (Original) A friction stir welding method according to claim 17, wherein:
after the friction stir welding has been carried out, reversing said first member and said second member, and

under a condition where said second plate of said first member and said second plate of said second member are overlapped, providing a second overlapped portion, carrying out friction stir welding to said second overlapped portion by inserting said rotary tool from at least an outer side of said first and second

members, to said second overlapped portion of said second member and said second plate of said member.

19. (Original) A friction stir welding method according to claim 17, wherein the friction stir welding is carried out at the same time from said outer side of said overlapped portion and from said outer side of said second overlapped portion.

20. (Original) A friction stir welding method according to claim 17, wherein:
a part of the end portion of said first plate of said second member is overlapped with said recessed portion of said first member,

another part of the end portion of said first plate of said second member is abutted to the end portion of said second plate of said first member,

a part of the end portion of said first plate of said first member is overlapped with said recessed portion of said second member,

a part of the end portion of said first plate of said first member is abutted to an end portion of said second plate of said second member, and

the friction stir welding is carried out to said abutted portions.

21. (Original) A friction stir welding method according to claim 20, wherein the friction stir welding is carried out to a depth below said recessed portion.

22. (Original) A friction stir welding method according to claim 17, wherein the respective third plates are orthogonal to the first plates.

Application No.: 10/600,577
Art Unit: 1725

Docket No.: 503.35255VX2
Page 10

23. – 38. (Canceled)